

where heavy rains at the end of September thoroughly saturated the soil, so that, despite the lack of rain for unusual periods of time, the water supply was sufficient for current needs except in local areas, where severe shortage existed. The month was unusually favorable for forest fires in the East and these occurred to a considerable extent over the larger forested areas.

Over the districts from the Dakotas, western Nebraska, and Colorado to the Pacific coast, precipitation was mainly well distributed through the month and in sufficient quantity to meet present needs. In fact, at points near the coast from northern California to Washington the month was decidedly wet, some localities having the greatest precipitation of record in October, effectually ending one of the severest droughts ever known in that region. In California particularly, where drought had persisted for so many months, the water shortage was greatly relieved and the forest-fire hazard, which had become acute, was terminated for the season.

Over the Florida Peninsula precipitation was unusually heavy, particularly near and along the Atlantic coast, where the monthly amounts ranged up to nearly 40 inches. These heavy falls were mainly associated with the passage of the tropical storm that moved over the southern portion on the 20th and 21st, although many of the greatest daily falls occurred in connection with a period of unusually heavy precipitation from the 4th to 11th. Marked contrasts are shown in the total amounts of precipitation for different parts of the State, the extreme northwestern portion having in some cases less than a quarter of an inch, while nearly 40 inches were recorded on the middle eastern coast.

SEVERE LOCAL HAIL AND WIND STORMS, OCTOBER, 1924

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path (yards)	Value of property destroyed	Character of storm	Remarks	Authority
Portales, N. Mex. (6 miles east of)	2	2 p. m.			Whirlwind	Framework of Rogers school building demolished; one person badly injured.	The Mexican (Santa Fe, N. Mex.), Official, U. S. Weather Bureau.
Southern Florida	20-21				Tropical winds	Shipping delayed; chief damage to truck and citrus fruits. Citrus crop damaged to the extent of 1,000,000 boxes. Considerable property loss by flooding.	Do.
Black Hawk County, Iowa	30		100	\$75,000	Tornado and rain	Many plate-glass windows and trees broken; wire systems demoralized; buildings unroofed; merchandise damaged by rain.	Do.
Fayette County, Iowa	30				Wind	Many farm buildings wrecked, livestock killed, and considerable hay blown away.	Do.

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STORMS AND WEATHER WARNINGS

WASHINGTON FORECAST DISTRICT

The first storm warnings of the month were displayed on the Alabama, Mississippi, Louisiana, and extreme northwest Florida coast in connection with a disturbance of slight intensity that developed over the east-central portion of the Gulf of Mexico during the 11th-12th. It apparently moved almost directly westward for 24 to 36 hours and then was deflected toward the southwest by a strong area of high pressure that covered practically the entire United States. No strong winds were reported from the land stations, but one vessel in the north-central Gulf reported 56 miles an hour from the northeast on the 12th and another a short distance from Tampico, Mexico, reported the same velocity from the northwest on the 14th. Shortly thereafter the disturbance apparently was dissipated before reaching the coast of Mexico.

SNOWFALL

But little snow was reported during the month over the districts east of the Rocky Mountains. In the far West, over all central and northern portions, there was more or less snow, depending on elevation, the amounts ranging up to 40 inches or more in the Sierra of central California and to nearly 60 inches in the Cascades of Oregon. In the main system of the Rocky Mountains the amounts ranged up to 30 inches in the high ranges of Colorado and to somewhat less in the more northern portions.

RELATIVE HUMIDITY

The percentage of moisture in the atmosphere was much less than normal in the central and western Gulf States, and generally over the middle and southern Plains and the middle Mississippi and lower Ohio Valleys, also locally in the Middle Atlantic States. Elsewhere the departures from normal were not important, being mostly negative except over the Florida Peninsula and portions of the Pacific States and the Plateau region.

SUNSHINE AND CLOUDINESS

From the Great Plains eastward there was mainly abundant sunshine, except over the Florida Peninsula, where cloudy weather and rain prevailed to an unusual extent. In portions of the lower Mississippi Valley and West Gulf States sunshine ranged from 75 to 90 per cent of the possible. From the Rocky Mountains westward, sunshine was generally somewhat less, considerably so in the far Northwest, but this is to be expected.

At 9:20 p. m. of the 14th, when the last advisory warning regarding the disturbance described above was issued, the following additional information was included:

Reports from northwestern Caribbean Sea indicate disturbance is developing northwest of Swan Island. Caution advised vessels departing for Yucatan Channel.

From this time until the evening of the 22d, when the storm was centered in about latitude 28° N. and longitude 71° W., twice daily advisories were issued regarding its location, intensity, and direction of movement. Until the evening of the 17th, when the storm had reached the proportions of a hurricane and was central about 100 miles west-southwest of Swan Island, it was difficult to locate the storm center definitely. There was apparently some retrograde movement during the 16th-17th, as the wind at Swan Island, which was moderate to fresh southwest and west on the 15th, gradually backed to southeast with little change in velocity and with very slowly falling barometer. During the night of the

17th-18th there was a marked increase in the force of the wind to 44 miles an hour at the a. m. observation of the 18th. The same morning, at 5 a. m., special observation from the U. S. S. *Denver* in latitude 17° 20' N. and longitude 85° 50' W. showed a barometer reading of 28.92 inches and a wind force of 12 from the southwest. Another valuable report from this vessel at 8 a. m. showed a 2-hour rise in barometer of 0.20 inch, which plainly indicated that the storm had at last begun to move northward, this information being included in the morning advisory warning of that date. The following warning was issued at 9 p. m. of the 18th:

Hurricane central about 20 north 86 west, apparently moving almost directly northward, attended by dangerous shifting gales. Vessels bound for southeastern Gulf of Mexico and Yucatan Channel should exercise every precaution. Hurricane will probably pass through Yucatan Channel or over extreme western Cuba late to-night or Sunday morning. Storm warnings extended northward to Cedar Keys and Titusville.

The hurricane passed over extreme western Cuba in the vicinity of Corrientes Bay before noon of the 19th according to information received later. At 9:30 a. m. of that date the following advisory warning was issued:

Hurricane warnings ordered 10:30 a. m. Jupiter to Punta Gorda, Fla., and northeast storm warnings extended northward to Jacksonville and Apalachicola. Hurricane center approaching extreme western end of Cuba, apparently moving north-northeastward, attended by dangerous shifting gales. Dangerous for vessels next 36 hours Florida Straits, southeastern Gulf of Mexico, and off southeast Florida coast.

At 5 p. m. of the 19th hurricane warnings were ordered displayed north of Punta Gorda to Cedar Keys. After reaching latitude 25 N. the hurricane turned rather sharply toward the east and passed inland near Cape Romano, Florida, about 50 miles south of Fort Myers, at about 8 p. m. of the 20th. It passed almost directly eastward over the Florida Peninsula with diminishing intensity, the center reaching the Atlantic Ocean some distance north of Miami on the morning of the 21st. The motor ship *Mexico* in latitude 26° 17' N. and longitude 79° 26' W., reported that the hurricane center passed at 10:20 a. m. The hurricane continued to move eastward until it passed beyond Great Abaco Island, Bahamas, after which it moved in an east-northeasterly direction. No reports were received from the region east of the Bahamas after the morning of the 22d. However, it is probable that the storm, with greatly diminished intensity, passed south of Bermuda on the morning of the 23d.

This hurricane was one of the worst ever known in extreme western Cuba; therefore a short description of its effects there and over the extreme southeastern portion of the Gulf of Mexico is given on page 513.

Frost warnings were issued on numerous dates during the month, the most important being those in connection with the cool wave that progressed steadily southward from Canada to the Gulf coast during the 20th-24th. On the latter date light frost formed as far south as Mobile, Ala., and heavy frost to Meridian, Miss., and Macon, Ga.—*C. L. Mitchell*.

CHICAGO FORECAST DISTRICT

Frost warnings.—At the beginning of the month the growing season had come to an end in most of Montana and Wyoming, but elsewhere in the district frost warnings were still required. Accordingly, these were issued from time to time as the conditions seemed to warrant, but as the month advanced the area where the warnings were needed became more and more restricted. In the eastern and southern portions of the district, the week beginning

on the 21st was cool and frosty, and killing frost occurred extensively. Frost warnings during the remainder of the month were needed only for a few limited sections, mainly in the extreme southern portion of the forecast district.

Cranberry marsh warnings.—The frost-warning service for the benefit of the cranberry interests in Wisconsin was terminated on the 7th, at which date most of the crop had been gathered. Several letters of appreciation for the services rendered during the 1924 season have been received.

Stock warnings.—The only livestock warnings issued were those of the 10th and 11th for Wyoming or portions thereof. In both instances the advices appear to have been justified.

Fire-weather warnings.—Fire-weather warnings were begun on the 25th for the benefit of the Forest Service at East Tawas, Mich., and were being continued at the close of the month.

Storm warnings.—No general severe storm affected the Great Lakes during the month, but one of considerable intensity prevailed over Lake Superior on the closing day. In two instances disturbances that developed marked intensity over the middle Rocky Mountain region were diverted from the normal course leading toward the Great Lakes by the presence of high-pressure area over the Northeast, and thus were forced to take a north-northeast or even a directly north track that carried the center into Canada far to the west of Lake Superior.

The most important disturbed periods were those covering the 5th, 8th-9th, and 30th-31st. On the morning of the 5th storm warnings were issued for the Upper Lakes, in connection with a disturbance then over northern Minnesota. The warnings were lowered 12 hours later, when it was evident that the storm was decreasing in energy. At most points where the displays were made strong winds occurred, and at Chicago the force of a moderate gale was reached.

On the 8th and 9th warnings were issued for Lake Superior and northern Lake Huron for a disturbance that moved northeastward from Colorado on the former date, at the same time losing energy. The center passed to the northward west of Lake Superior, and moderate gales occurred over most of Lake Superior on the afternoon of the 9th.

The last storm warning of the month, and the most important one, was that issued on the 30th. On the morning of that date a disturbance of considerable depth was over eastern South Dakota, while to the eastward, with its crest over the St. Lawrence Valley, lay a marked area of high pressure. The storm took a northeastward course and 24 hours later was centered north of Lake Superior. General storm warnings were issued in this connection, and in most cases verifying winds occurred. On Lake Superior the storm was rather severe. After subsiding on the 31st it underwent a redevelopment on the night of October 31-November 1, so that warnings had to be displayed again.—*C. A. Donnel*.

NEW ORLEANS FORECAST DISTRICT

Troughs of low pressure, forming in rapid succession over the Western States during the first decade, showed well-defined development on the eastern slope of the Rocky Mountains, but thereafter weakened and were displaced rapidly northward without having marked influence on the weather in this district. During the last few days of the month another trough, with strong